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TITLE: ACUTE PULMONARY RESPONSE OF MICE TO MULTI-WALL CARBON NANOTUBES

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ABSTRACT: Abstract: Widespread use of carbon nanotubes is predicted for future and concerns have been raised about their potential health effects. The present study determined the pulmonary response of mice to multi-wall carbon nanotubes (MWCNTs). The MWCNT suspension in sterile phosphate-buffered saline (PBS) was introduced into mice lungs by oropharyngeal aspiration. Female C57Bl mice were treated with either 20 or 40 μ g of MWCNTs in 40 μ l PBS and control groups received equal volume of PBS. From each group, half of the mice were euthanized at day 1 and the remaining half at day 7 post treatment. Bronchoalveolar lavage (BAL) fluids, serum, and lung tissue samples were analyzed for inflammatory and oxidative stress markers. The results showed significant cellular influx by a single exposure to MWCNTs. Yields of total cells and the number of polymorphonuclear leukocytes in BAL cells were significantly elevated in MWCNT-treated mice post-treatment days 1 and 7. Analysis of cell-free BAL fluids showed significantly increased levels of total proteins, lactate dehydrogenase, tumor necrosis factor- α , interleukin-1 β , mucin, and surfactant protein-D (SP-D) in MWCNT-treated mice at day 1 post treatment. However, these biomarkers returned to basal levels by day 7 post exposure except mucin and SP-D. An increase in the urinary level of 8-hydroxy-2'-deoxyguanosine in mice treated with MWCNT suggested systemic oxidative stress. Western analysis of lung tissue showed decreased levels of extracellular superoxide dismutase (SOD) protein in MWCNT-treated mice but copper/zinc and manganese SOD remained unchanged. It is concluded that a single treatment of MWCNT is capable of inducing cytotoxic and inflammatory response in the lungs of mice.